Choptank Road (SR 15) Planning Study
PDC Project Handoff
May 15, 2002

Appendices

Appendix A - Purpose and Need Statement

Appendix B – Stormwater Management Calculations

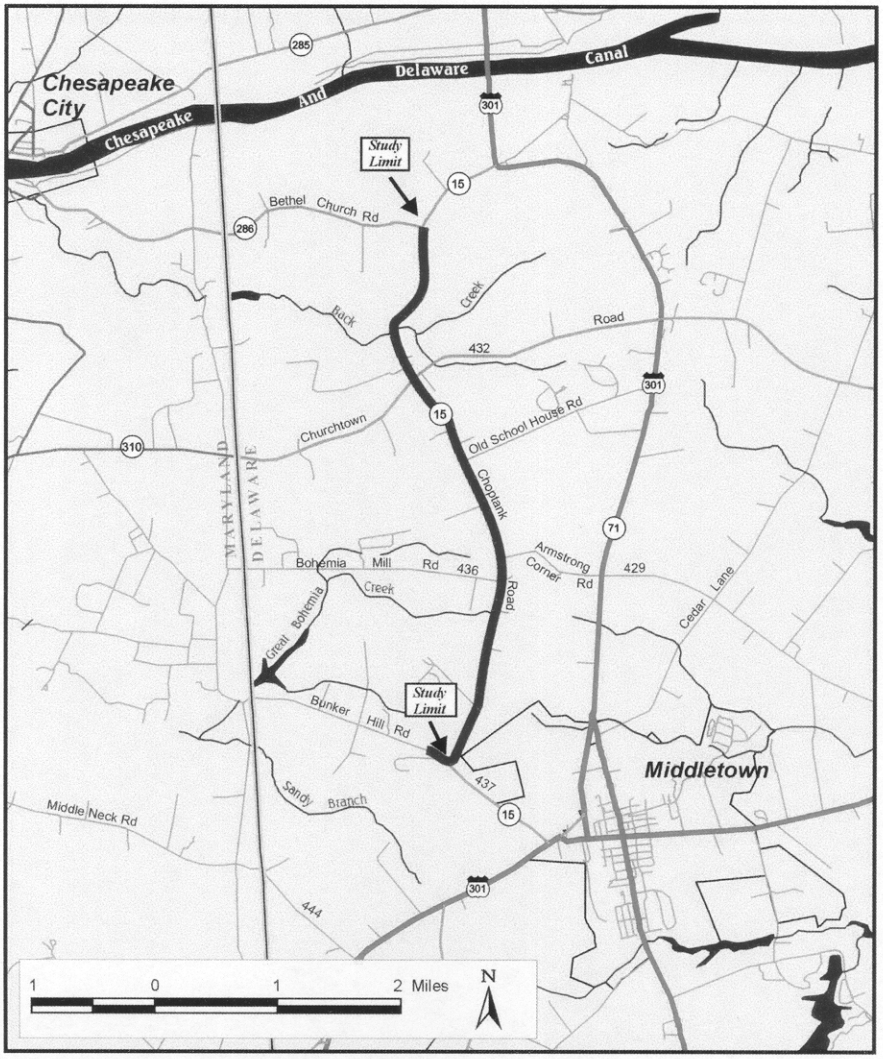
APPENDIX A

PURPOSE AND NEED STATEMENT

Purpose and Need Statement

Delaware SR 15 (Choptank Road)
Bethel Church Road to Bunker Hill Road
New Castle County, Delaware

Delaware Department of Transportation



May, 2002

LOCATION

Delaware SR 15 parallels US 301 in southwestern New Castle County from just south of the Chesapeake and Delaware Canal to west of Middletown, Delaware, as shown in Figure 1. Within the study area, SR 15 is a north-south roadway, and is referred to locally as Choptank Road. To avoid confusion with other sections of SR 15, this report will use Choptank Road when referring to the planning study section of SR 15 in southern New Castle County.

Figure 2 illustrates the study limits for the project: Bethel Church Road to the north and Bunker Hill Road to the south. Just beyond the study limits, at-grade intersections connect these two roadways back to US 301. Also included in the study area is the section of Bunker Hill Road from the Choptank Road intersection to approximately 600 feet to the west.

The study corridor is approximately five miles long. Within the corridor, Choptank Road averages 18 feet wide and carries two lanes of traffic with no improved shoulders. The roadway width varies at major intersections (Churchtown Road, Armstrong Corner Road and Bohemia Mill Road) and at the entrances to newer residential developments.

PURPOSE

The purpose of the Choptank Road Planning Study is to develop and evaluate transportation improvements that enhance safety throughout the corridor. The intent of the project is not to increase the roadway capacity by adding lanes, but to upgrade the existing roadway geometry and cross section to provide a more safe and efficient roadway serving existing and planned development. This project will improve the existing pavement conditions and provide adequate drainage facilities to carry runoff away from the roadway. Since Choptank Road is part of Bike Route One, the State's designated north-south bicycle route, any improvements will include bicyclists in addition to vehicular traffic in order to achieve multi-modal usage. Pedestrian needs will also be considered.

NEED

The need for the Choptank Road Planning Study improvements is to provide adequate access and mobility, improve safety, improve and widen the pavement section and better accommodate pedestrians and bicyclists.

Safety concerns and geometric deficiencies have been identified throughout the corridor, which contribute to accident rates higher than statewide averages. This is illustrated in the Safety section on Page 6. The existing roadway geometry and cross section contribute to the number of accidents. Much of the roadway geometrics do not meet current standards for this type of facility. Accident reports from 1997 to 2000 indicate that many accidents occur at curves and most involve only one vehicle. This is indicative of poor roadway conditions ranging from wet or icy pavement, geometrics that do not meet today's standards and, in some cases, excessive speeds.

Figure 1
Regional Map

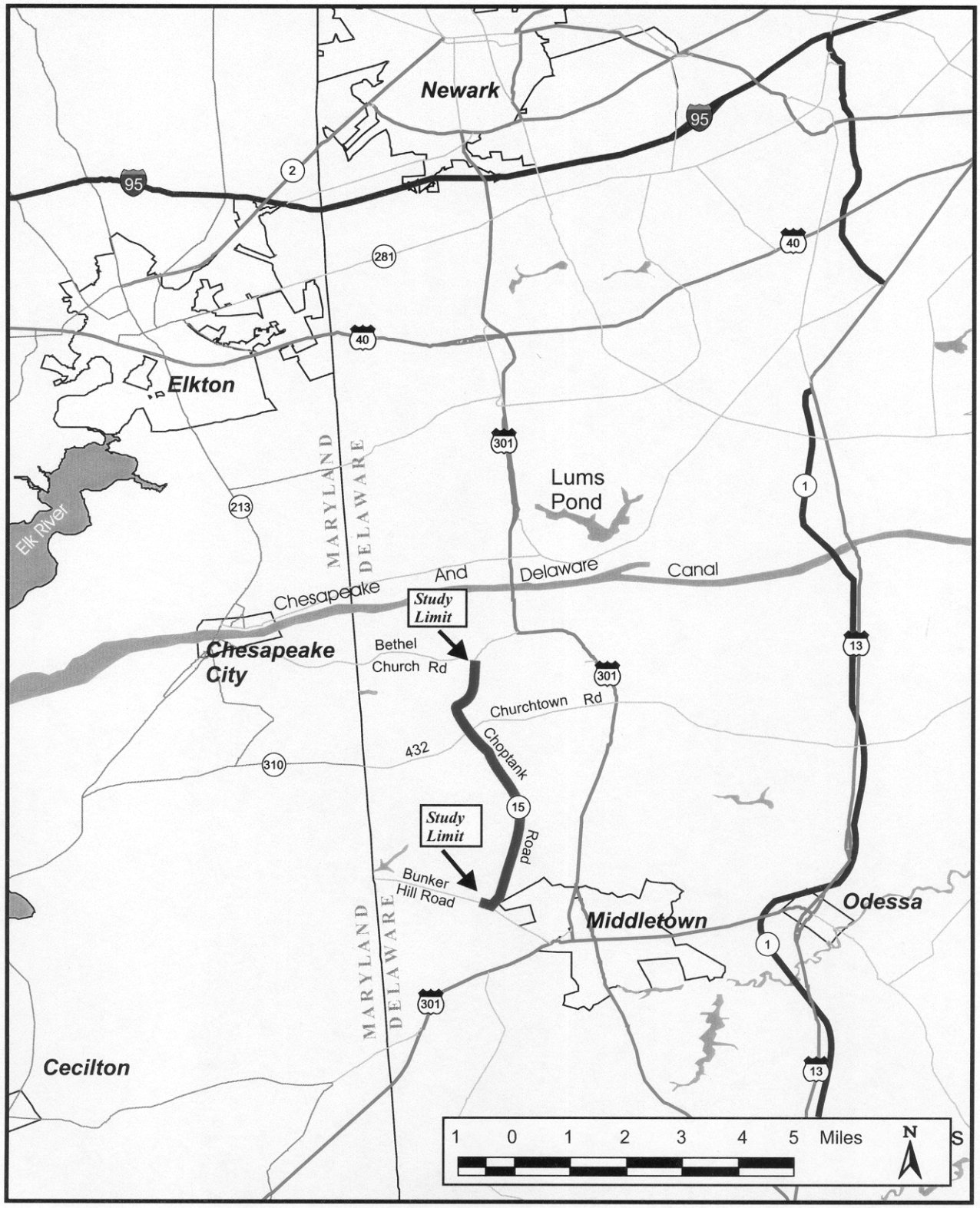
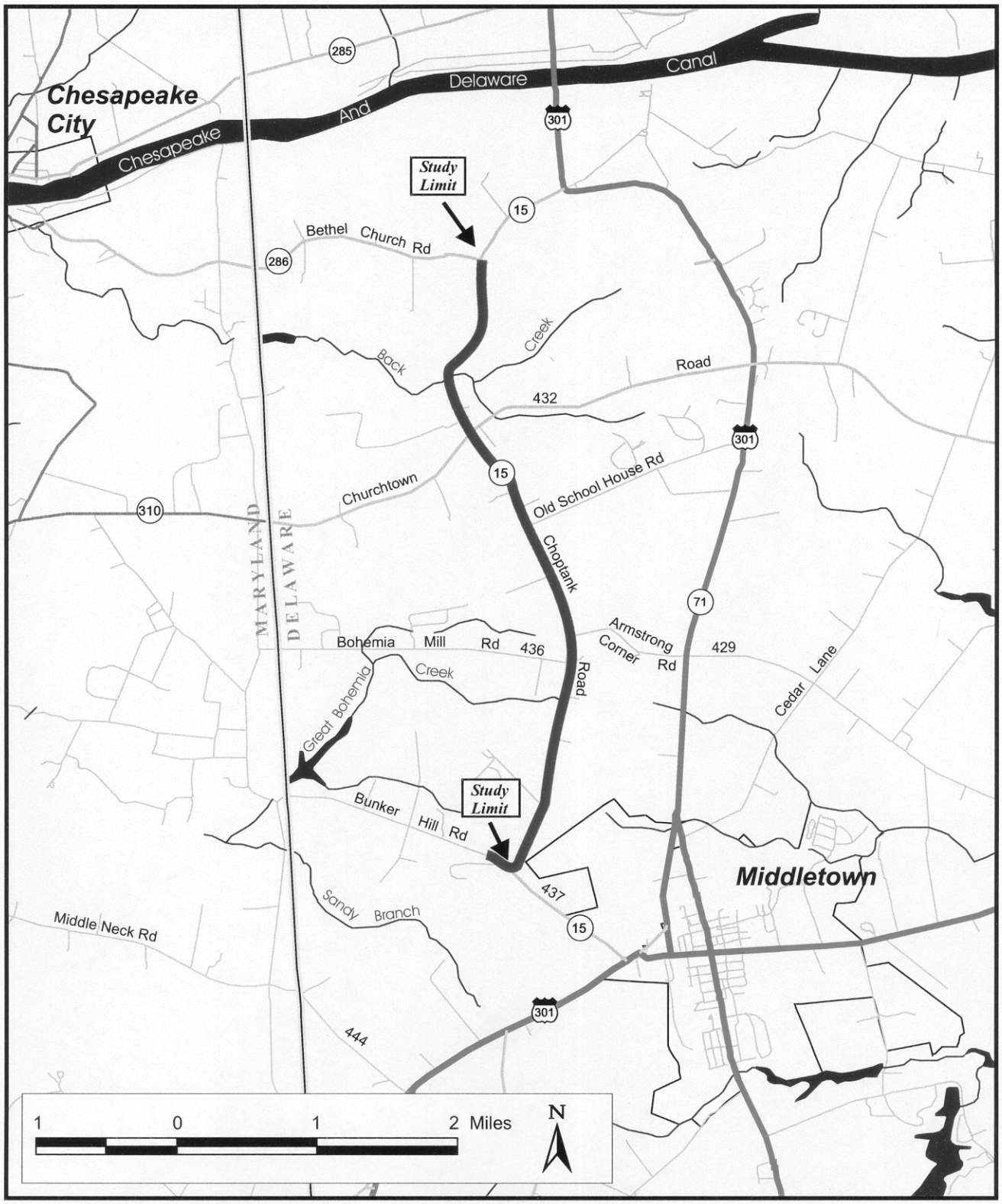


Figure 2
Study Area Map



Minor flooding and standing water are frequently found along the roadside ditches and at the pavement edge. This saturates the soil, which leads to early pavement deterioration in numerous locations. (See photographs in Appendix A.) Truck weight restrictions have been posted on Choptank Road to limit heavy load traffic and minimize further pavement failure.

Choptank Road through the project area is designated as Bike Route One. Increased attention to bicyclists as a mode of transportation has brought about the need to include bikeway facilities in roadway improvements where appropriate such as on Choptank Road.

Background

Choptank Road has served the communities and residences in the area west of Middletown for many generations and provides an important north-south connection between Middletown and the Chesapeake & Delaware (C&D) Canal. Its existence predates 1849. However, the exact date of construction is unknown.

The farms along Choptank Road gained their significance between 1830 and 1880. These farms grew a variety of crops including wheat, oats, corn and peaches. The prosperity of these farms allowed them to market their crops in Philadelphia, Baltimore and New York City. This was facilitated by the C&D Canal and the railroad that went through Middletown, connecting Dover and Wilmington. In addition to making their farms as productive as possible, the property owners also took pride in their homes and used much of their earnings to make their homes fashionable and prominent. Most of these farms have since gone into slight disrepair or were subdivided into lots for modern residential developments.

Functional Classification

Within the study limits, Choptank Road is a two-lane roadway with no access control. Although it is designated as State Route 1, it is classified in the State Functional Classification System as a Local Road.

The Choptank Road study limits extend from Bethel Church Road on the north to Bunker Hill Road on the south, and includes a 600 feet section of Bunker Hill Road. Cross streets within the study area include Churchtown Road, Old School House Road, Armstrong Corner Road and Bohemia Mill Road, which are all classified as local roads. In addition, numerous driveways and minor roads from residential developments intersect with Choptank Road.

Safety

DelDOT provided accident statistics for the three-year period from February 1, 1997 to January 31, 2000. During that period, a total of 43 accidents were reported along the study corridor, including seven reported accidents on the Bunker Hill Road segment. One accident (on Bunker Hill Road) was a fatal accident, and eleven accidents involved injuries. The remaining 31 accidents were property damage only accidents. Figure 3 summarizes the accidents reported in the study area.

As shown on Figure 3, accidents occurred throughout the corridor, and included both intersection and non-intersection related accidents. Review of the accident statistics reveals the following:

- Twenty of the 43 reported accidents (47 percent) occurred on wet pavement.
- Sixteen of the 43 reported accidents (37 percent) occurred during periods of darkness.
- Twenty-eight of the 43 reported accidents (65 percent) involved one vehicle. The remaining accidents involved two vehicles.
- Twenty-three of the 43 reported accidents (53 percent) were fixed object accidents. Other accident types included side-swipes (5 accidents), angle accidents (4 accidents), animal-related accidents (4 accidents), rear-end accidents (2 accidents), head-on accidents (1 accident) and four other accidents.
- Alcohol was involved in three accidents, including the fatal accident on Bunker Hill Road.
- Of the 43 reported accidents, seven occurred on the Bunker Hill road curve, 11 were related to the one-lane bridge over Back Creek (BR 377), and 14 were intersection related accidents.

A review of the narratives in the accident records provides additional information on the accident history on the Choptank Road Planning Study corridor. Several reports explicitly state that vehicles involved in the accidents were "travelling too fast" or "failed to negotiate a curve in the road." Speed is cited as a primary contributing factor in 13 of the 43 reported accidents (30 percent).

Although the raw accident statistics indicate a certain level of accident activity in the corridor, it does not take into account the traffic volume. Accident rates, computed in accidents per million vehicle miles traveled (acc/MVM), are also used to identify potential safety problems. The statewide accident rate for two-lane rural collectors is 2.74 acc/MVM, accordingto 1997 accident statistics. Table 1 summarizes the accident rates computed for various segments of Choptank Road.

Review of Table 1 indicates that the accident rate on each segment of Choptank Road is at least twice the average statewide rate for this road type. Table 1 also illustrates the influence of volume on accident rates, as even segments with a relatively low number of accidents have a high average accident rate, due to the low volume in that segment.

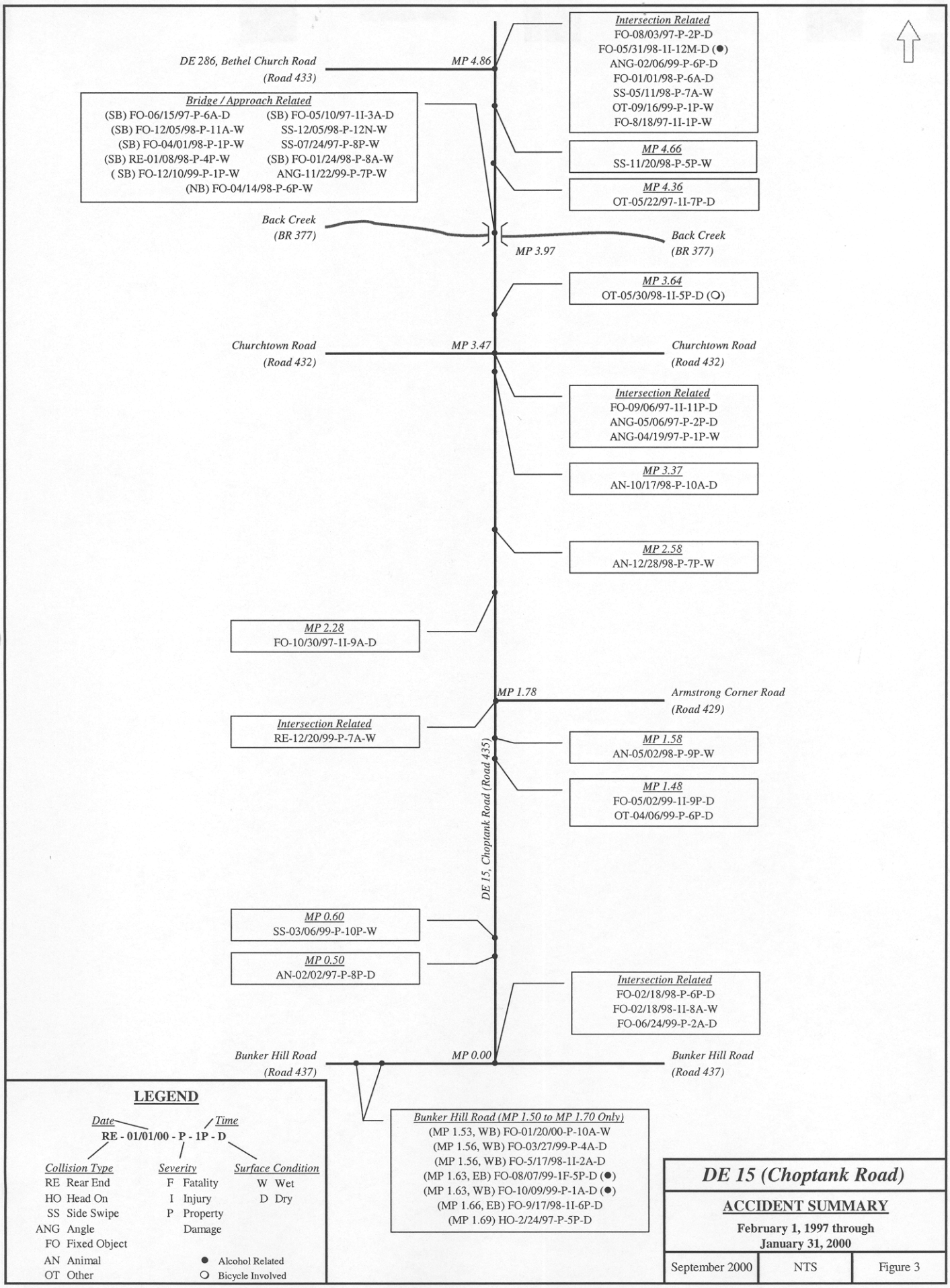

DE 286, Bethel Church Road
(Road 433)
MP 4.86
Intersection Related
FO-08/03/97-P-2P-D
FO-05/31/98-1I-12M-D (●)
ANG-02/06/99-P-6P-D
FO-01/01/98-P-6A-D
SS-05/11/98-P-7A-W
OT-09/16/99-P-1P-W
FO-8/18/97-1I-1P-W
Bridge / Approach Related
(SB) FO-06/15/97-P-6A-D
(SB) FO-05/10/97-1I-3A-D
(SB) FO-12/05/98-P-11A-W
SS-12/05/98-P-12N-W
(SB) FO-04/01/98-P-1P-W
SS-07/24/97-P-8P-W
(SB) RE-01/08/98-P-4P-W
(SB) FO-01/24/98-P-8A-W
(SB) FO-12/10/99-P-1P-W
ANG-11/22/99-P-7P-W
(NB) FO-04/14/98-P-6P-W
MP 4.66
SS-11/20/98-P-5P-W
MP 4.36
OT-05/22/97-1I-7P-D
Back Creek
(BR 377)
MP 3.97
Back Creek
(BR 377)
MP 3.64
OT-05/30/98-1I-5P-D (○)
Churchtown Road
(Road 432)
MP 3.47
Churchtown Road
(Road 432)
Intersection Related
FO-09/06/97-1I-11P-D
ANG-05/06/97-P-2P-D
ANG-04/19/97-P-1P-W
MP 3.37
AN-10/17/98-P-10A-D
MP 2.58
AN-12/28/98-P-7P-W
MP 2.28
FO-10/30/97-1I-9A-D
MP 1.78
Armstrong Corner Road
(Road 429)
Intersection Related
RE-12/20/99-P-7A-W
MP 1.58
AN-05/02/98-P-9P-W
MP 1.48
FO-05/02/99-1I-9P-D
OT-04/06/99-P-6P-D
DE 15, Choptank Road (Road 435)
MP 0.60
SS-03/06/99-P-10P-W
MP 0.50
AN-02/02/97-P-8P-D
Intersection Related
FO-02/18/98-P-6P-D
FO-02/18/98-1I-8A-W
FO-06/24/99-P-2A-D
Bunker Hill Road
(Road 437)
MP 0.00
Bunker Hill Road
(Road 437)
Bunker Hill Road (MP 1.50 to MP 1.70 Only)
(MP 1.53, WB) FO-01/20/00-P-10A-W
(MP 1.56, WB) FO-03/27/99-P-4A-D
(MP 1.56, WB) FO-5/17/98-1I-2A-D
(MP 1.63, EB) FO-08/07/99-1F-5P-D (●)
(MP 1.63, WB) FO-10/09/99-P-1A-D (●)
(MP 1.66, EB) FO-9/17/98-1I-6P-D
(MP 1.69) HO-2/24/97-P-5P-D
LEGEND
Date
Time
RE - 01/01/00 - P - 1P - D
Collision Type
RE Rear End
HO Head On
SS Side Swipe
ANG Angle
FO Fixed Object
AN Animal
OT Other
Severity
F Fatality
I Injury
P Property Damage
Surface Condition
W Wet
D Dry
● Alcohol Related
○ Bicycle Involved
DE 15 (Choptank Road)
ACCIDENT SUMMARY
February 1, 1997 through January 31, 2000
September 2000
NTS
Figure 3

Table 1. Choptank Road Accident Rate Summary (2/97 through 1/00)

Choptank Road Segment	Number of Accidents	Average Accident Rate (acc/MVM)
Entire Length, including bridge (4.86 miles)[1]	36	11.27
Entire Length, not including bridge (4.53 miles)[1]	25	8.40
Bunker Hill Road to Armstrong Corner Road (1.78 miles)	8	11.73
Armstrong Corner Road to Churchtown Road (1.69 miles)	6	5.90
Churchtown Road to Bethel Church Road, Including bridge (1.39 miles)[1]	22	15.21
Churchtown Road to Bethel Church Road, Not including bridge (1.06 miles)[1]	11	9.98

[1] Rates are computed both including and excluding accidents related to the one-lane bridge over Back Creek and its approaches. Widening and re-alignment of the roadway approaches to the bridge are being completed as part of a separate project.

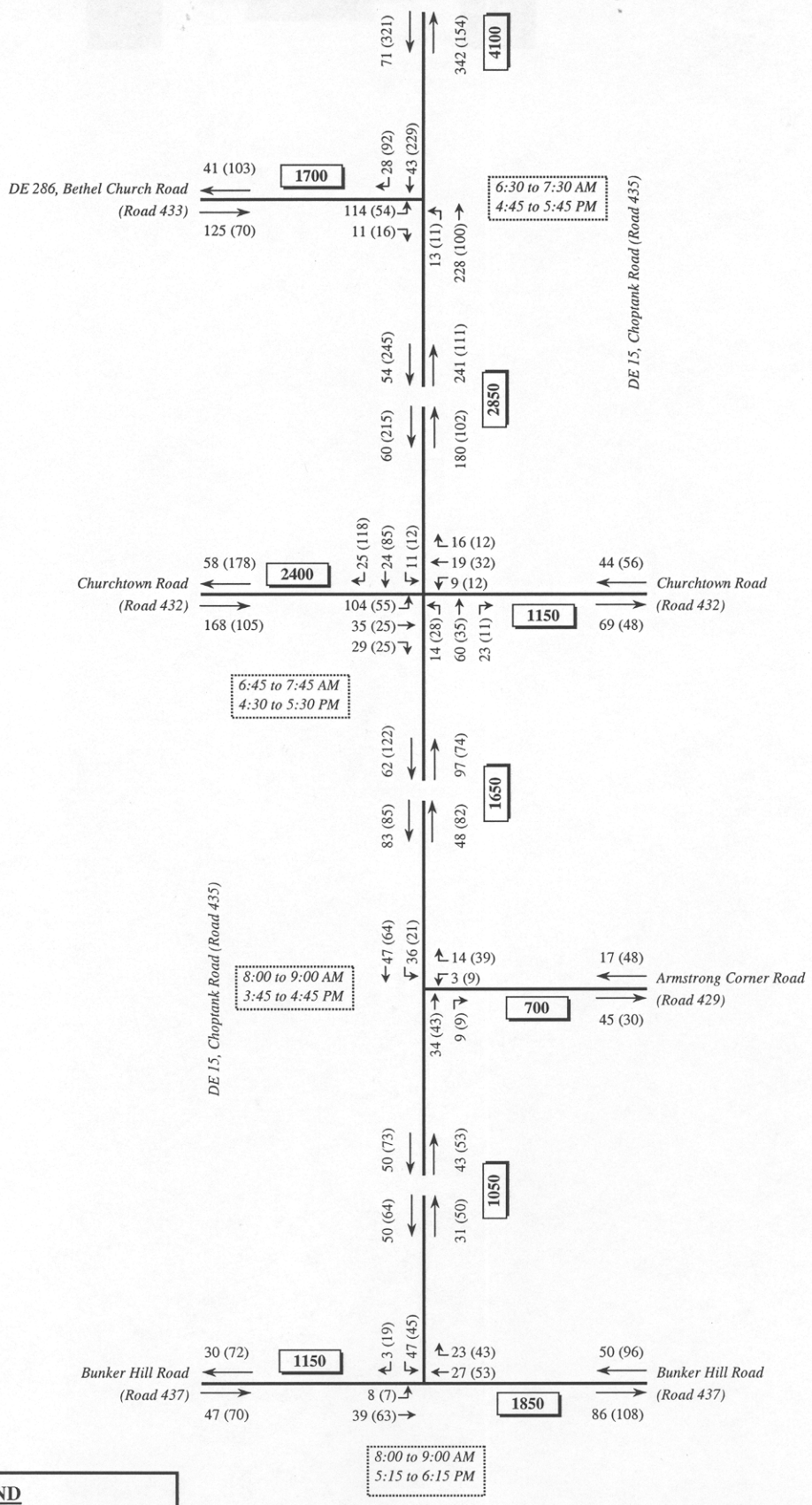
Traffic Volumes

The observed peak hour turning movement volumes for Choptank Road are shown on Figure 4. (These volumes were derived from traffic counts conducted at the four intersections shown from 6:30 AM to 9:30 AM and 2:00 PM to 6:30 PM on Wednesday, June 7, 2000.) Average daily traffic volumes, computed using factors provided by DelDOT, are also shown on Figure 4.

Review of Figure 4 reveals that traffic volumes on Choptank Road increase from the south to the north. Comparing departures from one observed intersection to the arrivals at the next observed intersection often leads to relatively large discrepancies. This is due, in part, to the number of minor roads and driveways between observed intersections, and is indicative of the "local road" character of Choptank Road.

Table 2 summarizes the heavy vehicle, pedestrian and bicycle volumes observed during the data collection period. Although there are posted weight restrictions on Choptank Road (No Trucks Over 16,000 lbs. Except Local Services), heavy vehicles comprise nearly five percent of the volume on Choptank Road. These were mostly local delivery vehicles and dump trucks accessing the quarry on Armstrong Corner Road located east of Choptank Road. Twelve of the 16 observed pedestrians at the Choptank Road/Churchtown Road intersection were on Churchtown Road. Only six bicycles were observed during the data collection period.

Volumes forecasts developed for the 2012 design year were largely based on the travel forecasts from the US 301 Corridor Study. The US 301 forecasts take into account area-wide factors such as existing and proposed land use and planned developments. The forecast 2012 average daily traffic volumes and the resultant peak hour turning movement volumes are shown on Figure 5.



LEGEND

AM (PM)	2000 Peak Hour Volumes
8:00 to 9:00 AM 5:15 to 6:15 PM	AM and PM Peak Hours
4100	2000 Average Daily Traffic Volume

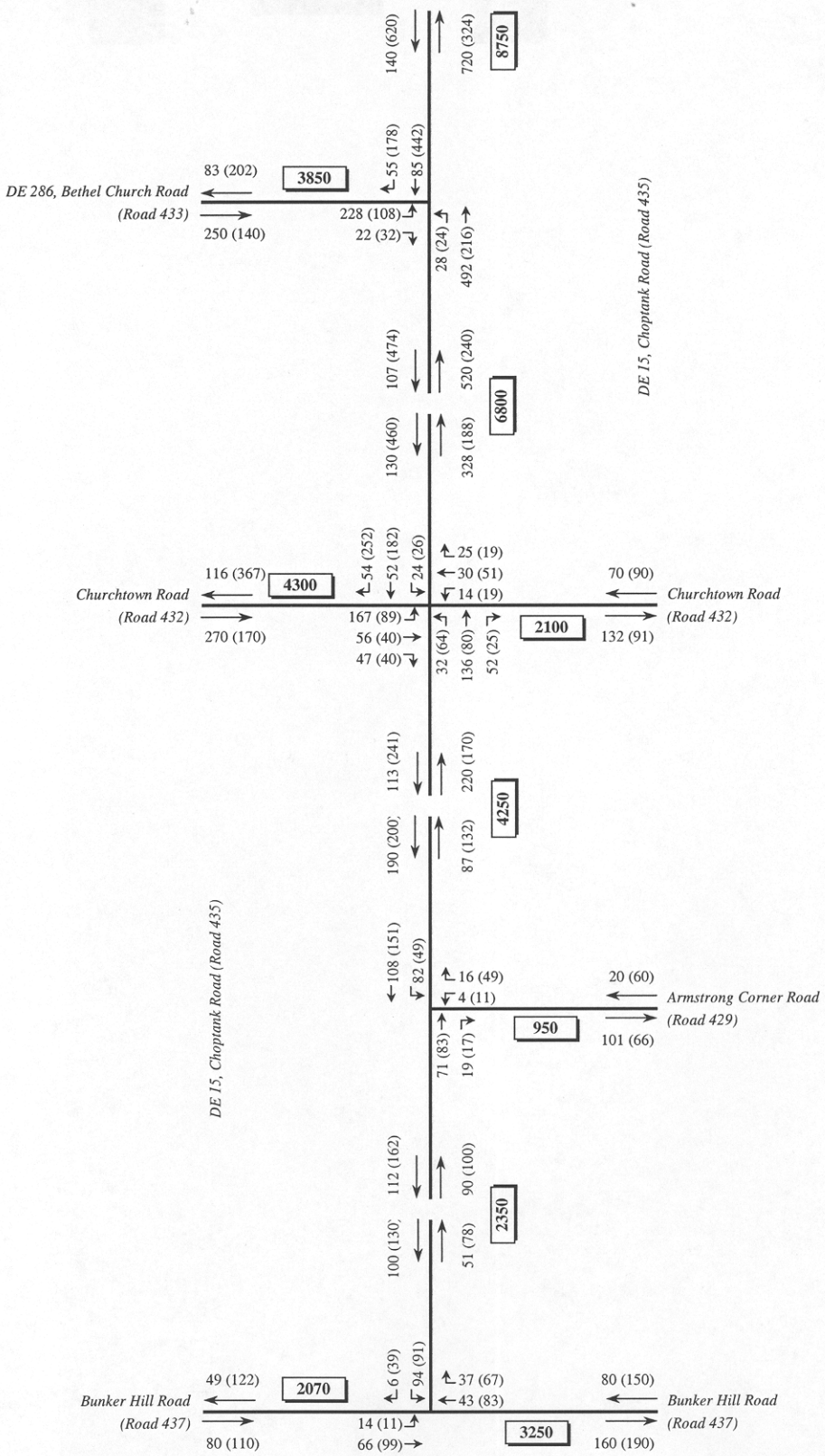
NOTES:
1) All intersection turning movement data collected Wednesday, June 7, 2000.
2) Average Daily Traffic based on collected turning movement volumes and adjustment factors provided by Delaware Department of Transportation.

DE 15 (Choptank Road)

EXISTING CONDITIONS

PEAK HOUR VOLUMES AND AVERAGE DAILY TRAFFIC VOLUMES

September 2000	NTS	Figure 4



LEGEND

AM (PM)	2012 Peak Hour Volumes
4100	2012 Average Daily Traffic Volume

DE 15 (Choptank Road)

2012 NO-BUILD CONDITIONS

PEAK HOUR VOLUMES AND AVERAGE DAILY TRAFFIC VOLUMES

September 2000	NTS	Figure 5

Table 2. Observed Heavy Vehicle, Pedestrian and Bicycle Volumes[1]

Location Choptank Road at:	Heavy Vehicle Volume / Percent of Total Volume	Pedestrian Volume	Bicycle Volume
Bethel Church Road	139 / 4.8 %	1	2
Churchtown Road	206 / 7.9 %	16	4
Armstrong Corner Road	53 / 4.9 %	0	0
Bunker Hill Road	87 / 6.8 %	2	0

[1] Based on observations at the four intersections indicated from 6:30 AM to 9:30 AM and 2:00 PM to 6:30 PM on Wednesday, June 7, 2000

Traffic Operations

Level of service (LOS) analyses of both existing and forecast traffic volumes were conducted based on the methods outlined in the 1998 Highway Capacity Manual. Unsignalized intersection analyses were performed at locations where counts were conducted. These traffic volumes were forecasted to study YR. 2012 and two-lane highway analyses were conducted on three Choptank Road links. Locations of traffic analysis and the results of that analysis are shown on Figure 6.

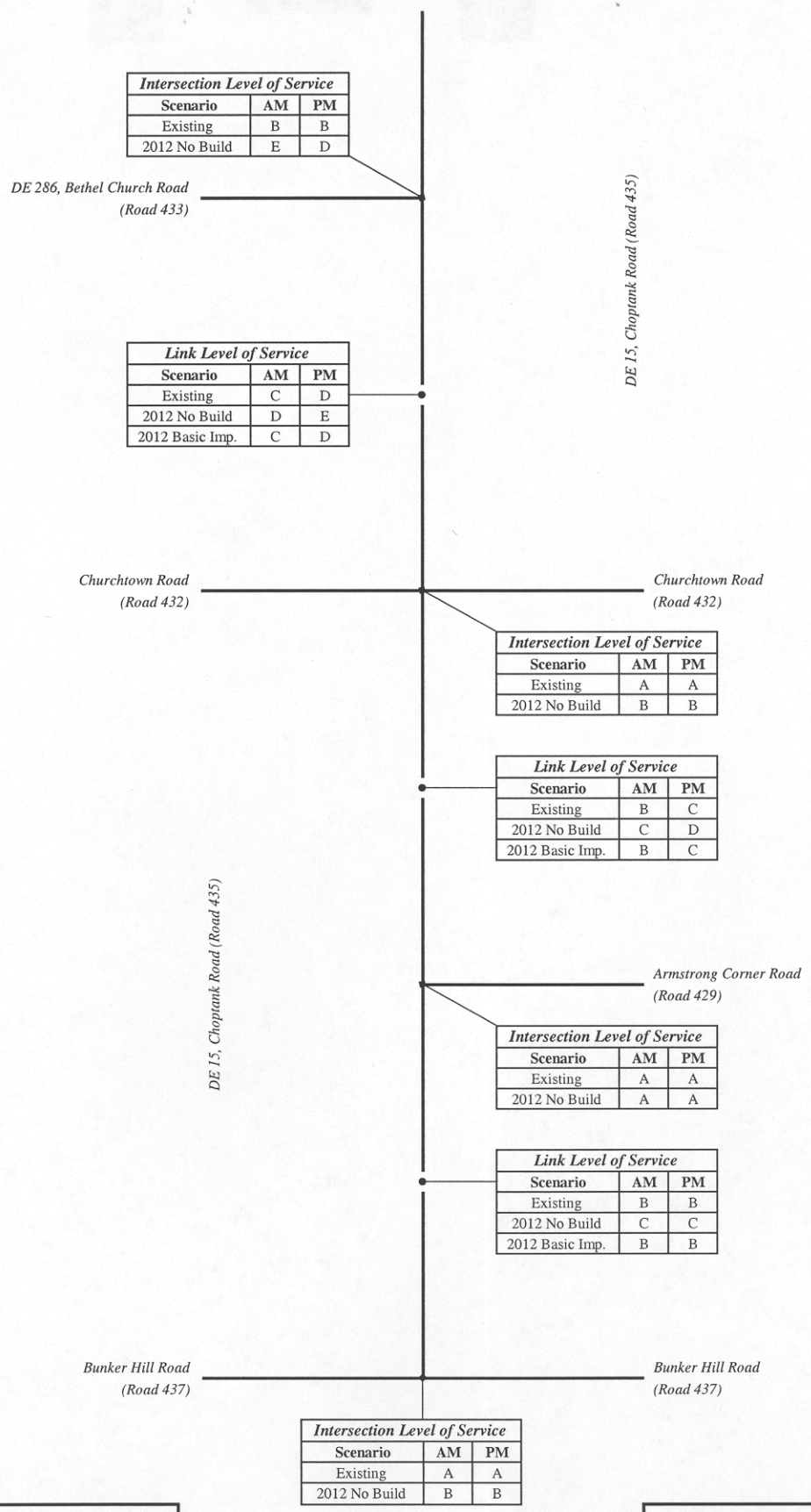
The Choptank Road roadway segments to the south of Churchtown Road currently operate at LOS C or better, while the roadway segment to the north of Churchtown Road operates at LOS D during the PM peak hour. Despite the relatively low volumes on Choptank Road, the narrow lanes and lack of shoulders decrease the LOS.

Analysis of the 2012 No-Build scenario results in LOS C or worse for all roadway segments, with the segment north of Churchtown Road expected to operate at LOS E during the PM peak hour. The 2012 Basic Improvements option analyses assumes two-twelve foot lanes and five foot shoulders on Choptank Road (as outlined in the CIP). These improvements return the 2012 level of service to the same as observed under existing conditions.

Under existing conditions, each of the four intersections operates at LOS A. Without intersection improvements, only the Choptank Road/Bethel Church Road intersection is expected to operate below LOS B in 2012.

Land Use

The area surrounding the project is primarily used for agricultural purposes. Several residential developments have been approved and are currently being constructed. These developments will generate increased traffic as more homes are constructed. Also, several large farm tracts are being subdivided into lot sizes ranging from 12 to 70 acres. No major commercial development or manufacturing facilities are proposed along Choptank Road.



LEGEND

NOTES: 1) All analyses performed using methodologies outlined in the Highway Capacity Manual and the Highway Capacity Software (v.3.1b)

DE 15 (Choptank Road)

EXISTING AND 2012 ANALYSIS

Level of Service Summary

September 2000	NTS	Figure 6

However, nearby residential, commercial and manufacturing development along Bunker Hill Road near US 301 is being constructed. This is part of Middletown's expansion to the west, which could contribute to the use of Choptank Road in the future.

Other Related Transportation Projects

Choptank Road crosses over Back Creek just north of Churchtown Road near the northern limits of the study. DelDOT has recently replaced this bridge (BR 377) with a new wider structure. The previous bridge at Back Creek was one lane wide requiring vehicles to yield to oncoming traffic. This problem was exacerbated by the bridge's location on a horizontal curve. The proposed Choptank Road improvements would connect to this new bridge and improve the sight distance around this curve.

In addition, DelDOT is planning to improve US 301 through this area although no schedule has been set. The final, selected package of improvements for US 301 will be phased in over many years and, depending on the alternative chosen, may include major road capacity increases. These could range from Dualization of the existing US 301 and SR 896 (south of the C&D canal) to a new four lane limited access highway between the Maryland line and SR 1, as well as minor and major roadway expansions north of the C&D canal. An Environmental Impact Statement will need to be prepared, with subsequent review, coordination and agreements with federal/state agencies, leading to location, design and possible funding. Funding is available within the project allocation for improvements to the secondary road system in southern New Castle County, the first of which is Choptank Road.

Conclusion

In conclusion, Choptank Road needs to be upgraded to enhance safety throughout the corridor. The study will focus on improving the roadway geometrics and typical section. This may include changes to the roadway horizontal and vertical alignments, lane widths, the addition of shoulders and well-defined ditches and improvements to the pavement. The proposed improvements will provide a safe and efficient roadway to serve any existing and planned development.

Multi-modal uses will be incorporated into the design. Accommodations for the various users of the corridor are important as this roadway is designated as Bike Route One.

Appendix A

Pavement Failure on Northbound Choptank Road, approaching Churchtown Road

Standing Water and Pavement Failure on Both Sides of Choptank Road, North of Old Schoolhouse Road

Pavement Drop-Off on Northbound Choptank Road, Approximately One Mile South of Churchtown Road

Horizontal Curve on Bunker Hill Road, West of Choptank Road.